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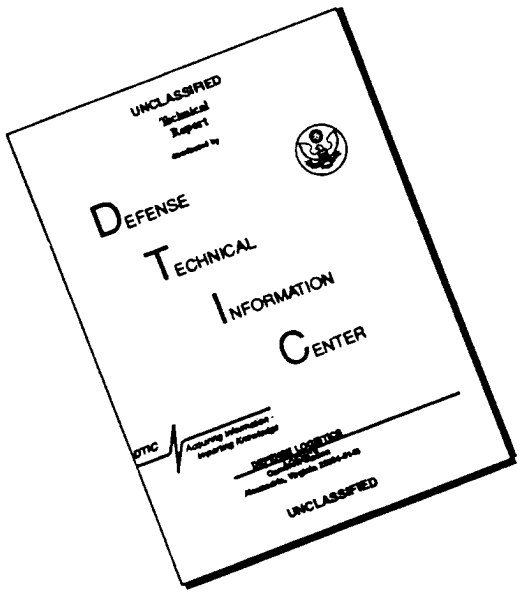

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PREPARED BY:

TRANSLATION SERVICES
NATIONAL AIR INTELLIGENCE CENTER
WPAFB, OHIO

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AutoPERT NETWORK PLANNING CALCULATION-PLOTTING SYSTEM
Beijing United Aerospace Software Development Corporation

AutoPERT Network Planning Calculation-Plotting Program System

The Program and Evaluation Review Technique (PERT) is an advanced project plan management method, which can display the sequence and relations between individual activities included in a plan with standard network graphics, calculate the key path of the plan, and control its implementation most rationally through optimization and adjustment. The network planning technology is widely used in planning and organizing scientific research, engineering, production, and large-scale social activities, and serves as a major component of management information systems (MIS) and project management systems.

By integrating network planning functions such as compiling, plotting, and dynamic adjustment, the AutoPERT program system can perform calculations, plotting automatically and avoiding such complex calculations and repeated graphic modifications as were encountered in the part when PERT was widespread. Therefore, it is a practical software, convenient in use. The 1.1 version of this software CPERT was appraised by the Ministry of Aviation in 1986 and won the Third Science and Technology Award issued by the ministry. With constant upgrading and improvement in the past few years, its version has now been upgraded to 5.1 as the

"network planning calculation-plotting program system (AutoPERT)," employed by over thirty users, including enterprises and research institutes in the aircraft, electronics, and chemical industries, as well as Asian-Games engineering.

This software has the following features:

1. It can be flexibly and conveniently used in interactive form with the help of menus.

2. It can perform juncture analysis, activity analysis, time difference analysis, probability analysis, and key route analysis for network graphics that are used to arrange the order-of-acknowledgment type, non-acknowledgment type, topological type, and/or nontopological type.

3. Based on calculations, it can automatically arrange junctures, automatically plot, and keep nodes conformably to the earliest operation time.

4. By using the two-coordinate system of calendar coordinates and engineering-day coordinates, it can provide four activity time units, namely, day, week, month, and hour, and can also deduct holidays with a clear contrast.

5. It can give plotting data in the DXF file format; with the AutoCAD system (or other CAD systems), it can plot on the screen editing network graphic, printer, and plotter output network graphics. The graphics thus plotted can ensure a rational layout, distinct charts, and standard Chinese characters.

6. It has the function of manual modification, i.e., it can modify calculation parameters (such as the number of nodes and sides) and make an adjustment over the picture layout on the

screen.

7. It has excellent capability of making spreadsheets: print and output various spreadsheet-result analyses, as well as standard Gant charts.

This software can provide different language environments, operated under single and multiple-user environments with convenient data exchanges. AutoPERT can be either applied to industrial production, engineering, and maintenance planning as an independent planning software, or incorporated into large project management software as a planning subsystem.

Beijing United Aerospace Software Development Corporation
Address: Room 409
168 Xizimen Nei Avenue
Beijing 100035
Please contact Dai Yin and Wang Guixiang.

WE WILL CORDIALLY SUPPLY CLIENTS WITH
TECHNOLOGY AND PRODUCTS

Beijing United Aerospace Software Development Corporation
China Aerospace Software Development Corporation

The China Aerospace Software Development Corporation, incorporated with over 30 colleges and universities, research institutes, and plants under the Ministry of Aerospace, specializes in the development of system software, application software, and hardware and software system compatibility. During the Seventh Five-Year Plant Program, with dynamic high-tech personnel and excellent facilities as well as a solid technical foundation and long years of experience, our company provided overall technical support and services to various projects, including machinery, electronics, CAD/CAM, engineering management, and the like. Through our efforts, our country has begun gradually keeping pace with developed countries in overall aircraft and engine design, as well as in avionics design and processing. Additionally, during the Seventh Five-Year Plan Program, large investments were made in developing a diversity of hardware and software. Moreover, large numbers of young engineers and technicians were sent abroad for further study and for participation in large-scale projects, at home and abroad. Some world-famous companies, such as the Boeing Corporation in the United States, and McDonnell-Douglas Corporation have been our business partners for many years. We are proud of having a

technically mature staff.

The guidelines we followed are: taking the market as the guiding direction, advanced technology as our bedrock, economic benefit as our center, and perfect service as our theme; bringing together all enterprises and institutions under the aircraft industry to display full-range supremacy; fostering a competent industrial force of high quality; opening up the home market and overseas market; and gradually formulating a software industry of a certain scale.

We have a strong leading body composed of assistant general managers, chief engineer, and advisers directly responsible to the general manager. In the firm there are several divisions, including a technology development department, marketing department, technical support department, and administrative office; individually, these divisions are responsible for developing computer software systems and corresponding matching systems, marketing, technology dissemination, technical consultation, technology transfer, technical exchange, and technical services, along with businesses such as manufacturing electromechanical, electronic, and instrument products. The firm's aim is to provide diversified businesses with high-quality and high-efficiency services in technology upgrading, technical advances, and new product design and manufacturing, as well as becoming involved in various project contracts. We look forward to extensive exchanges and sincere cooperation with manufacturers at home and abroad, and with software firms and users in various areas.

(1) CAD/CAM

The mechanical CAD/CAM system integrates two-dimensional engineering plotting modules, three-dimensional wire frames, curved-surface modules, finite-element modeling modules, solid-

object modeling modules, and numerically-controlled programming modules as a whole.

(2) Management Software

Engineering management software, accounting software, Chinese-English language word processing software, and data management software.

(3) Network

Authorized networks and general network allowing a flexible interaction and data sharing between users in accordance with international standards.

(4) Machine Room Fixtures

Complete machine room fixture services, including high-quality static-electricity-resistant floors, air conditioning, UPS [uninterruptible power supply] work tables, etc.

(5) Industry Control

A complete set of industry control hardware and software series.

(6) Hardware

PC-386's with a satisfactory production performance-cost ratio. We are a sales agency for HP, SGI, and DEC computer products.

Address: Room 512, Building Number 3
172 Xizimen Nei Avenue
Beijing 100035
People's Republic of China
Telephone: 6739929-592
Please contact Dai Yin and Wang Guixiang.

PANDA 4: CAD/CAE/CAM SYSTEM

Beijing United Aerospace Software Development Corporation

Brief Introduction to PANDA 4 System

The PANDA 4 system is new-generation line-block, curved-surface, and solid-object modeling system, developed on the basis of two fundamental elements of the integrated product-information model, IPIM: geometry and topology in a STEP standard draft. It includes stereogrammic plotting, three-dimensional modeling, and numerically-controlled machining of complex parts, development of modules for designing solids of revolution and box-type part characteristics--all included in technical manuals for products. This system proved to have rather strong adaptability.

Technically, PANDA 4 is mainly based on line-block operations, superimposed interpolation curved-surface generation, and curved-surface customizing.

The PANDA 4 system exhibits its major characteristics as follows:

1. Geometric elements inside the system are subject to the NURBS representative forms of unified nonuniform rational B splines and evaluation algorithms. Straight lines, circular arcs, and regular secondary curved surfaces retain their

respective analytical expressions until they are connected to form composite curves and to generate composite curved surfaces, when they will automatically rise in order and shift to the NURBS representation.

2. This system can provide three modeling methods: line blocks, curved surfaces, and solid objects, which constitute three mutually compatible models of three levels by means of a unified data structure.

3. The NURBS curved-surface intersection solution is based on the algorithm for solving for initial values with a numerical method, fully-intersecting line tracking, and iteration fineness, which can ensure required precision and reliability in intersection solutions. Based on the foregoing, curved-surface customizing and circular transitions are realized. At the same time, superimposed-interpolation curved surfaces can be produced on any two, three, or four given boundary curves.

4. Through automatic search and synthesized commands, isolated sides in line-block models can be connected to form closed rings and, further, by covering the rings on the same surface with the superimposed interpolation method, line-block models can be transformed into curved-surface and solid-object models with the same final data storage format. This is a simple and reliable parallel method for curved-surface customizing and solid-object bifurcation. All the curved-surface and solid-object boundaries are represented with an accurate NURBS instead of using polyhedral approximations.

5. This system provides 2.5- and 3-axis numerically-controlled processing modules, which can program and process any curved surface and solid object established in PANDA 4. At the same time, processing feeding tracks can be edited manually, and cutting-tool tracks on complex curved surfaces can be

automatically checked and cutting-tool interference can also be eliminated.

6. Based on line-block, curved-surface, and solid-object models, characteristic modeling design is possible. Axis and box-type parts can be designed with variable methods, during which their structural dimensions can be easily modified, and characteristic parameters can be directly entered into the CAPP system for automatic design of production processes.

7. Through projective conversion, characteristic models and line-block models can directly generate two-dimensional graphics, which are input into, in the DXT file format, the two-dimensional plotting system to be finely subdivided to form standard schedule drawings.

The PANDA 4 system as a modularized integrated system can assemble operating versions of different functions, depending on users' needs. In this case, different modules are closely associated with one another without mutual interference, and information transmission between modules is achieved within a unified data structure.

PANDA 4 contains the following seven modules:

Environment module
Line-block modeling module
Curved-surface modeling module
Numerically-controlled processing module
Characteristic modeling module
Application module

(1). The environment module includes submodules as follows:

1. Graphic-display submodule

Functions: graphic enlargement, reduction, moving, blanking, coloring, and display direction modification.

2. Display-control submodule

Functions: controlling display or nondisplay of all elements in this system (lines, surfaces, grids, objects, etc.)

3. Working-coordinate system submodule

Functions: generating rotation, translation of working-coordinates and coordinate systems with different methods.

4. View port management and control submodule

Functions: providing five display modes including view 4 display mode, primary view plus axonometric drawing mode, view port transformation in single view mode.

5. File-management module

Functions: file storing and retrieving (including color files and standard TIFF format files).

6. Current color and window size setting

Functions: setting up plotting colors and current window size.

(2) The line-block modeling module includes the following submodules:

1. Point-generation submodule

Functions: this system can provide seven point-generation methods.

2. Line-generation submodule

Functions: this system can provide ten methods to generate various straight lines.

3. Circle and circular-arc submodule

Functions: this system can provide ten methods of producing various circles and circular arcs.

4. Spline-type curve submodule

Functions: generating spline curves, helical lines, parabolic lines, projection lines, curved-surface upper boundaries, etc.

5. Line-block editing submodule

Functions: PANDA 4 can provide nearly 40 line-block editing methods, such a break, translation, rotation, mirror images, deletion, etc.

(3) The curved-surface modeling module contains the following submodules:

1. Plane submodule

Functions: this system can provide nearly ten methods of creating various planes.

2. Regular curved surfaces

Functions: a total of seven regular curved surfaces, including ruled surfaces, rotating surfaces, spherical surfaces, cylindrical surfaces, etc.

3. Advanced curved-surface submodule

Functions: this system can provide ten methods of producing construction-interpolation curved surfaces, such as generating interpolation-curved surfaces with three or four given space boundaries.

4. Curve-editing submodule

Functions: this module can provide twenty curved-surface editing means, such as curved-surface customizing, curved-surface extension, transition, etc.

(4) Solid-object modeling module includes the following submodules:

1. Object-element definition submodule

Functions: this submodule can offer seven basic object element definitions, including cubes, cylinders, rotating planes, etc.

2. Object-element editing submodule

Functions: this submodule contains object-element rotation, mirror images, translation, chamfer angles, etc.

3. Boolean-operation submodule

Functions: this submodule provides object-element intersection, combination, and differential operations.

4. CSG-tree editing submodule

Functions: this module can offer CSG-tree modification, deletion, insertion, etc.

(5) The numerically-controlled processing module includes the following submodules:

* 2.5-axis numerically-controlled processing module
* 3-axis numerically-controlled processing module

1) Brief introduction to 2.5-axis numerically-controlled processing module

This module consists of six submodules.

* Track-generation submodule
* Track-editing submodule
* Control-parameter submodule
* Track-transformation submodule
* Processing-emulation submodule
* File and post-processing output submodule

The major functions of this module are:

Generating biaxial processing tracks of arbitrary outlines (including arbitrary internal flats). There are four track feeding nodes: zigzag, zig, follow, and outline processing. Cutting-tool tracks, while generated, can be subjected to synthesized editing and modification as well as dynamic processing-emulation display. The post-processing output can support only the FANUC 7 system at present.

2) Brief introduction to 3-axis numerically-controlled processing module

This module is composed of six submodules:

* Track generation
* Interference checking
* Track editing
* Emulation display
* Control-parameter setting
* File and post-processing output

Any curved surface generated in the PANDA 4 system can be edited and processed in this module. Processing cover single-curved-surface processing and multiple-curved-surface processing. For complex curved surfaces, it is possible to conduct automatic checks, to eliminate cutting-tool interference, and to carry out dynamic emulation-display processing. At present, post-processing output is completed with the output-data-segment method and subsequently, by increasing the first and last processing files for each machine tool.

(6) Brief introduction to characteristic modeling module

Characteristic modeling is achieved on the basis of line blocks, curved surfaces, and solid objects. Currently, this module can offer characteristic design for axis and box-type parts, which is conducted following a variable method, where the structural dimensions can be easily modified, and with one dimension altered, other dimensions will automatically change accordingly. Characteristic parameters can be directly imported into the CAPP system for automatic design over the technological process. At present, this module can provide nearly 20 characteristic definitions, including internal and external cylinders, spirals, keyways, chamfer angles, cubes, enveloped angles, etc. This characteristic model can not only change into a curved surface model conveniently, but can also generate, through projective conversion, a two-dimensional drawing DXF file format to be input into the two-dimensional plotting system for

fine subdivision with standard schedule drawings formed.

(7) The application module includes the following submodules:

1. Plotter interface

At present, only the HP plotter interface is available.

2. DXF interface

3. Two-dimensional finite-element grid automatic subdivision

The PANDA 4 system exclusively uses C language for programming, which contains 120,000 statements, with the largest operating system, 7MB, and the smallest operating version, 3MB. The system consists of seven modules that can formulate different operating versions according to users' needs.

Operating environment

IBM PC 386 or 486 microcomputers and their compatible clones, 4MB internal memory, DOS 3.3x operating system, WINDOWS 3.x window environment, EGA, VGA, SVGA, and other graphic cards that support WINDOWS.

Beijing United Aerospace Software Development Corporation
Address: Room 409
168 Xizimen Nei Avenue
Beijing 100035
Please contact Dai Yin and Wang Guixiang.

CPDS MICROCOMPUTER COLD-PRESSING DIE CAD/CAM SYSTEM
Beijing United Aerospace Software Development Corporation

Microcomputer Cold-Pressing Die CAD/CAPP/CAM System

Brief Introduction to CPD

The cold-pressing die CPD-CAD/CAPP/CAM system as an interactive, open system provides such functions as design, plotting, production process analysis, manufacturing, etc., which is suitable for design and manufacturing of pressing dies, step-by-step dies, and bent dies. Based on the world-famous automatic plotting software AutoCAD, a standard-mold graphic library and a database were established in this system to extend it curve and curved-surface functions. Its CAPP functions include edge calculations, pressure-center calculations, parts typesetting, work step calculations for bent shaping dies and developing calculations for complex part shapes, etc. As for CAM, with a contour programming method available for cold-pressing die production, this system can not only simplify three-dimensional curved-surface definition, but also automatically optimize cutting-tool routes. Further, it has other functions such as tape punching, input and direct communication with numerically-controlled machine tools.

Graphic Library

To enhance its design-plotting efficiency and to promote product standards, a complete set of practical graphic libraries were established in this system, from which users can call needed graphics in accordance with cold-pressing die graphic file index.

Character Library

This system can SHAPE special graphic files of AutoCAD to define Chinese characters and provides users with a special character library.

Graphic Editing

Graphic editing functions include ordering outline-graphic elements of prototype workpieces; accurate location of graphic intersection points; column moving, copying, mirror image, reduction or enlargement, cutoff, insertion, fillet transition, fineness processing, listing, deletion, modification of graphic files; making cutting-tool track graphics.

Pressing-Die Typesetting

Pressing-die typesetting functions cover angle determination; listing optimization and automatic optimum typesetting. Typesetting involves single typesetting, double typesetting, head-to-head single typesetting and head-to-head double typesetting. Output content covers typesetting graphics, prototype-workpiece area, step distance, material width, material-utilization ratio, etc.

Pressure Center

Pressure-center calculations are used to calculate, based on material shear strength, material thickness and azimuth of prototype-workpiece graphics, pressing-force and pressure-center

coordinate values so as to eventually output graphic files.

Edge Calculations

Edge calculations are conducted to calculate mold-wear coefficient; maximum and minimum gaps, concave-convex plate nominal dimensions and deviations so as to output all the results, based on selected workpiece precision, mold type, material type, cross-section quality, dimensional change after wearing, mold-gap coefficient, nominal-dimension type, and input-workpiece thickness, and upper and lower deviations of nominal dimensions.

Dimension Substitute

Dimension-data substitutes can be used to automatically retrieve dimension-database information. The actual-dimension information thus retrieved can be used to substitute for the symbol dimension in graphic files with all substitution results outputted.

Post-Processing

Post-processing functions include reading-tape information in diskette files, punching diskette file information in tape, tape checking, code-display file editing, code transfer (including interchange 38 format, EIA, ISO, and ASCII codes).

Curve Processing

Curve-processing functions cover conversion of listed curves into actual curves (including parametric-spline method, Bezier method, etc.), cutting-tool track calculations, and post-processing.

Curved-Surface Processing

Curved-surface processing functions include conversion of listed data into actual curved surfaces (COONS method), cutting-tool track calculations and post-processing, displaying actual curved surfaces and cutting-tool tracks in wire-frame mode.

Technological Analysis

Technological analysis can be performed on minimum hole distance, minimum width of concave-convex section.

2.5-3 Coordinate Contour Programming

This programming can automatically generate cutting-tool processing routes, if only the orifice contour graphic, orifice-fillet radius and slope of individual sides in depth direction as well as transitional-fillet radius and depth of bottom face are given by users. It can perform automatic numerically-controlled programming for face-groove parts with multiple isolated flats.

Tensile Dies

The tensile-die production calculation program can perform functions including blank calculations, work step calculations, and individual work step shape design.

Bending Dies

Bending-die technological calculations can perform spreading-length calculations, bending-force, and rebound-angle calculations, as well as initial design of female and male dies.

Beijing United Aerospace Software Development Corporation
Address: Room 409

168 Xizimen Nei Avenue
Beijing 100035
Please contact Dai Yin and Wang Guixiang.

PDGS PARAMETRIC DESIGN GRAPHIC SYSTEM

Beijing United Aerospace Software Development Corporation

This system, based on dimensional driving, is a two-dimensional parametric design system developed to meet schedule drawing requirements. By using five-element groups, dimension-annotation values, base references, structured auxiliary lines, contour lines, and constraint models of schedule drawings with directed-graph definitions, it can realize parametric designs for arbitrary dimensions and has the capability of making limited annotations for nonstandard dimensions. In the case when users attempt to annotate dimensions with closed dimensional chain (i.e., overconstrained), the system can offer prompts so as to achieve limited annotations for nonstandard dimensions.

For existing schedule drawings, the original drawing can be input with a scanner, which is then read into, under this system, the TIFF format file or graphic file of scanned drawings and is considered as a base map to be edited directly on the screen with given constraints and dimensions. In this way, parametric designs can easily be realized. During these operations, the scanner can be replaced with graphic input plates, or simply a mouse can be used to generate parametric graphics. Graphic data can not only be stored in the database with graphic structures for future reference and calls to form package drawings or

assembly drawings, but can also be stored in the DXF (the more popular AutoCAD graphic file format) file format so as to communicate with AutoCAD and constitute desired schedule drawings by taking the advantage of AutoCAD functions.

This system has the following features:

1. Each step provides explicit relations between geometric definition and inner constraints to ensure a one-step solution and therefore, its algorithm has high efficiency and reliability.

2. Correlations between parameters can be established by using a data structure, with simple geometric reasoning and rapid system response.

3. The uniqueness of solutions in the parametric process can be controlled with directed graphs.

4. The interactive parametric design covering the pathway from draft to accurate geometric model can be easily and conveniently modified.

Parametric Design Applications

There are identical or related dimensions in schedule drawings, such as relations between standard part dimensions and its key dimensions; identical chamfer angles and fillets; length, width, and height of three views or some particular expressions relating between dimensions. When a certain dimension is modified in the parametric process, other related dimensions are expected to change accordingly, which requires that relations between related dimensions be established in graphics.

With parametric design, engineering designers can draft parts drawings as soon as possible without considering details as

well as upgrade their design through changing some constraint parameters without going through the entire production process. Therefore, parametric design is well accepted by engineering designers as an efficient means to perform initial design, to edit, to modify product models, and to compare several design options.

Parametric design explains the geometric characteristics of products with geometric constraints. When appropriate constraint relations are given, geometric models of products can be determined automatically through specific constraint values.

1. Serialization

In schedule drawings, there are a large number of parts that have identical or similar shapes but different dimensions. From these series parts, engineering designers anticipate obtaining the corresponding parts by changing one or several key dimensions, which can hardly be achieved by using the conventional CAD system or manual plotting.

The best advantages of parametric design are displayed in designing series products, which generally have the same (at least similar) topologic structure but different dimensions, tolerance, and other kinds of information. In designing series products, it is simply required to store one topologic model (or is referred to as basic product model) and a data lookup table. And if improvement or modification is needed, the corresponding drawing sheets can be acquired through changing a set of parameters, which not only can promote the sharing of drawing sheets, but is convenient for management, retrieving, and filing, as well.

2. Similar Parts

Since any part is generally formed on the basis of structural combinations of basic characteristics, a "composite part" can be formed when some characteristics are concentrated on one part. And by increasing or deleting a few characteristics from composite parts, similar parts can be generated from "parent drawings," i.e., a set of similar parts can be derived from one particular part.

3. Design Modifications

The parametric design method can reflect the whole design process. Users start their design from drafts, set up definition constraints, structured geometric model, and then modify the model through modifying the constraints, which signifies a design process from concept to final geometric model.

Repeat modification is always necessary in designing new products. When one dimension is modified, mutual relations between individual dimensions can be reflected dynamically, and mutual interference between individual dimensions can be checked. Also, repeat modification can lead to a better design and create new products.

4. Increasing Design Efficiency and Reducing Costs

With our parametric design, geometric models can be quickly defined and modified to meet the needs of modern competition. Generally speaking, product design bears some inheritance character, i.e., a new product is virtually an improvement of an original product. Our parametric design allows making full use of the drawing sheets, material, machine tools, and technology of original products, and as a result, it can save manpower and spending, shorten the product-development time, and eventually promote the vitality of an enterprise.

System Functions

This system, as an interaction-aided two-dimensional parametric design system, enjoys many functions as follows:

1) Basic plotting elements, such as points, lines, circles, arcs, splines, etc.

2) Automatic or manual dimension annotation

3) Graphic editing and modification, reduction and enlargement, display, deletion, increase, and change of arbitrary dimensions

4) Subgraph combination and transformation, etc.

5) File management

6) DXF interface and communication with AutoCAD

Introduction to Function Menu

1. Initialization

Unit--select plotting unit
Scale--plotting scale
Initial--pick plotting system origin
Color--select colors

2. Making Auxiliary Lines

Aux-LP--cycle reference and then pick one point or input dimension value

Aux-LNP--pick reference and then pick one point or input dimension values

Aux-genal--general auxiliary lines, including the following seven cases:

Pl-ang--give one point and angle as auxiliary line

Pl-cir--make a tangent to a circle by crossing one point

TT-cir--make a tangent common to two circles

LPLN--make a line perpendicular to a known straight line by crossing one point

LCPT--make a tangent to a circle past one point in the circle

LPLP--make a parallel line to a given straight line past a known point

pot-pot--make an auxiliary line past two known points

Aux-circl--auxiliary circle, covering 16 cases:

Center-R--center+radius

Center-D--center+diameter

pot-3--a circle crossing 3 points

pot-2--a circle crossing 2 points

Crcct--given a radius, a circle tangent to two known circles

Cppct--a circle tangent to another circle past 2 points

Cppl--a circle tangent to a straight line past 2 points

Cprct--given a radius, a circle tangent to another circle past one point

Cprit--given a radius, a circle tangent to a straight line past one point

Cpct--given a direction, a circle tangent to another circle past 1 point

Crict--given a radius, a circle tangent to a straight line and a circle

Ttr--given a radius, a circle tangent to two known straight lines

C-same--concentric circle

C-offset--equidistant circle

Cpl--taking a known point as center, a circle tangent to a straight line

C-ppr--given a radius, make a circle past two points

3. Contour Line Plotting

Line--a line connecting 2 points

Cent-lin--a central line passing 2 points

Poly-line--polylines (straight line, broken line, circular arc)

Arc-circular arc

Circle--like auxiliary circle, it also includes 16 cases

Hatch--section line

Chamfer--chamfer angle

two-lin--make a chamfer angle with 2 lines

one-pot--make a chamfer angle with an intersection point

Fillet--fillet

Spline--spline curve

4. Dimension Annotation

Linear--linear dimension

Element-pick--element annotated dimension

Two-pot--pick two points to annotate dimension

Angular--annotation angle

Diameter--annotation diameter

Radius--annotation radius

Chamfer--annotation chamfer angle

Coffset--annotation equidistant circle

Arcoffset--annotation equidistant circular arc

5. Editing Functions

Drag-Dim--drag dimension

change-Dim--change dimension

Re-dirc--change circle direction

Re-dirl--change straight line direction

Del-elem--delete plotting element

Del-dim--delete dimension

Break--break plotting element

Mirror-mirror image

6. Display Functions

Zoom--window enlargement

Pan--moving observation

List-Dim--display dimension information

CheckDim--check dimension relations

CheckEle--check plotting element

checkMem--check internal storage

7. File Management

Save--save graphic file

Load--load in graphic file

Save-DXF--save graphics in DXF format

Ins-ele--insert subgraph

8. Static Menu Functions

Undo--undo previous step of operation

Newmode--clear the screen

Redraw--redraw

Poly-arc--composite line and circular arc switch

Auto-Dim--automatic annotation dimension

Undo-pick--pick again

Exit--exit system

9. Function Keys

F1--point input mode

Screen--pick 1 point on screen

Keyin--key pad input

Snap--snap point

F2--symmetry (on/off)

F3--point types:

Two-lin--intersection point between two lines

Lin-cir--intersection point between point and circle

Cir-Cir--intersection point between two circles

EaistP--existing point

Tangentp--tangent point

F4--identical dimensions (on/off)

F5--line types:

Solid--solid line

Dash-lin--dashed line

Pot2-in--2-point scribing

Cent-lin--central line

F6--auxiliary line display (on/off)

F7--automatic dimension annotation (on/off)

Beijing United Aerospace Software Development Corporation
Address: Room 409
168 Xizimen Nei Avenue
Beijing 100035
Please contact Dai Yin and Wang Guixiang.

UniCode GRAPHIC SYMBOL LIBRARY OF TANGO ELECTRONIC CAD SOFTWARE. TANGO-SCHEMATIC-NEW-LIB

Beijing United Aerospace Software Development Corporation

UniCode Graphic Symbol Library of TANGO Electronic CAD Software (1993 New Version)

TANGO-Schematic-NEW-LIB

TANGO-Schematic-NEW-LIB is part of the TANGO-Schematic module. NEWLIB is loaded in three 1.2M floppy diskettes with all library files encrypted, which, therefore, can be used only with an additional 360KB "key" floppy diskette.

Technically, TANGO-Schematic-NEW-LIB is an electrical-drawing-oriented graphic symbol library, upgraded in accordance with GB4728 standard (compatible with IEC617), which was officially brought into use on January 1, 1990. It is convenient for users to call the symbols they want by referring to the TANGO-Schematic instructions, with which they can draw new standard electronic circuit principal charts with Chinese callouts.

Differing slightly from the old version graphic symbol library, this library has some unique features in usage.

1. A special subdirectory such as "ECAD" must be set up in

the hard drive before downloading all the library files in TANGO-Schematic-NEWLIB diskette into this subdirectory.

2. For view-function configuration, select TANGO-Schematic-NEWLIB-Edit diskette (i.e., "key" diskette) and insert it in drive A to download all nonlibrary files in the diskette into that subdirectory.

3. Execute Edit under the "C>" prompt (special hard drive subdirectory) and then come to the main menu, followed by loading needed library files from drive C by using the TANGO-Schematic-Edit library call method, and then, under the graphic editing state, call the needed symbols with the TANGO-Schematic-Edit device symbol call method. Noticeably, the "key" diskette must be inserted in drive A throughout the symbol call process.

There are a total of 28 library files on the diskette.

The element device graphic symbol library, named GB*.LIB, contains 14 files, where * is the serial number that is identical to the 13 standard serial numbers in GB4728. For instance, GB121.LIB and GB122.LIB are element graphic symbol libraries of GB4728-12 standard binary logic units (i.e., digital IC circuits) containing over 2100 kinds of symbols (including series lower than 74 * 645, 54 * 645, the domestic T1000-T4000 series, CMOS, interface, some complex parts, etc.). GB13.LIB is a linear-integrated-circuit-element graphic symbol library which conforms to the GB4728-13 standard with more than 700 kinds of symbols (including operational amplifiers), comparators, triode voltage regulators, some number-module hybrid interface devices, etc.). GB.LIB to GB11.LIB are element graphic symbol libraries that correspond to GB4728-3 to GB4728-11 standards. GBS.LIB are qualified symbol libraries that require supplementary annotation, such as integration, summation, ternary output, OC output, magnetic delay, etc. GBC1 *.LIB to GBC4 *.LIB are Chinese-

character symbol library files (16 dot matrix and 24 dot matrix), eight in total, with more than 7400 characters loaded in the international area and positional-code Chinese-character symbols, as well as over 2500 non-Chinese symbols.

The files of the five libraries: INTER.LIB, MEMORY.LIB, CMOS.LIB, ADDA.LIB, and COMPAR.LIB, respectively, contain nearly 600 integrated circuit device symbols of the INTEL series, various storage, CMOS series, AD/DA series, and comparator series. JACK.LIB is a connector symbol library containing several dozens of symbols for the connectors installed on printed circuit boards.

All symbols in the library support the TANGO Principal Chart--PCB integrated design.

In addition, standard graphic block of A1 through A4 graphs and a diskette file of instruction are provided for users.

Examples of TANGO-Schematic-NEWLIB graphic symbols are shown in the attached figures.

Instructions for Area and Positional-Code Chinese-Character Library of TANGO Electronic CAD Software Circuit Principal Chart Design Module

This Chinese-character library, as part of the TANGO-Schematic Module, can be called in the editing mode of the Edit Principal Chart, which is similar to the mode with the element-device graphic-symbol library. It includes eight library files, among which GBC1.LIB to GBC4.LIB are 16 dot-matrix character library files, while GBC1-24LIB to GBC4-24.LIB are 24 dot-matrix character library files.

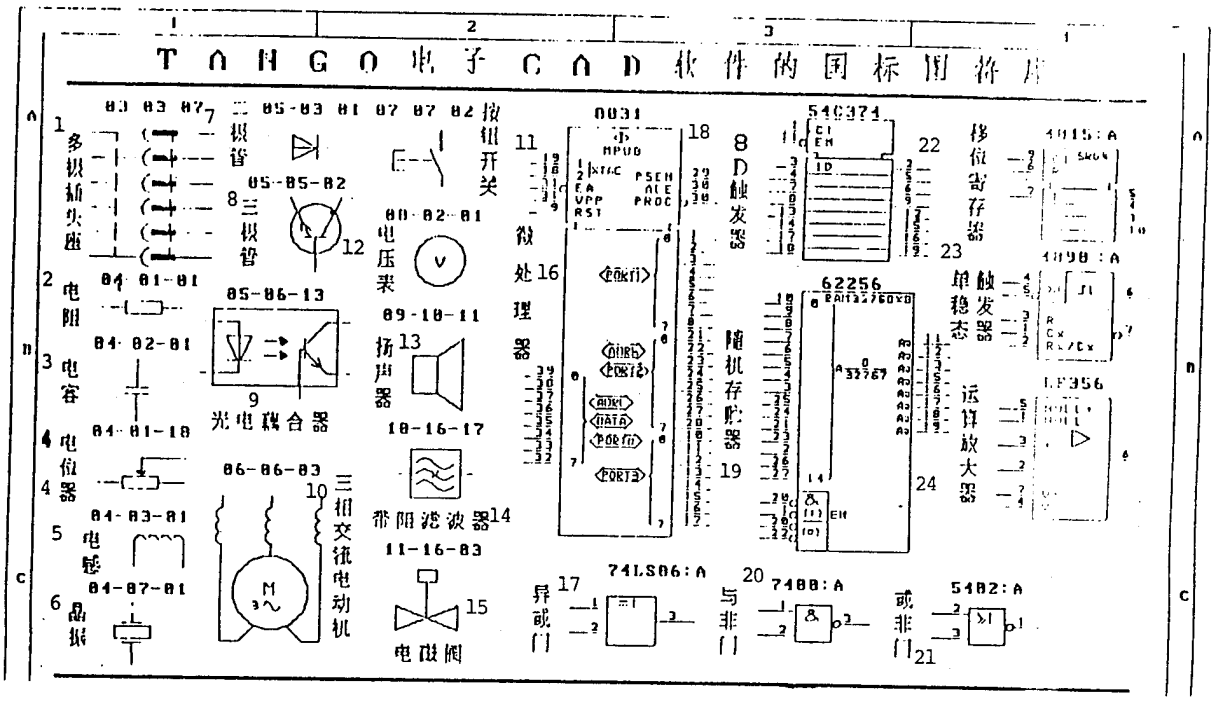
All Chinese characters in the library are expressed in the

UniCode area and the positional-code area, which, when used, must be first loaded into the library files by pressing key "i" under the Edit main menu prompt, and then the corresponding Chinese characters can be called in accordance with the element graphic symbol call mode under the principal chart editing. It is noted that the area and positional code of a particular Chinese character must be keyed in (please refer to Chinese-character area and positional-code table). For instance, key in "2171" to annotate the word "electricity"; key in "4528" to annotate the word "graphic"; key in "0624" to annotate "OMEGA", etc.

It is to be noted that different Chinese-character library files include different area and positional-code symbols. The first level Chinese-character library contains more than 7400 Chinese characters, which, respectively, are downloaded in GBC2 *.LIB, GBC3. *LIB, and GBC4 *.LIB, while GBC1 *.LIB includes approximately 2500 non-Chinese symbols. The area and positional codes for character symbols in the different library files are listed as follows:

GBC1 *.LIB: 0100-1599 (non-Chinese symbols)
GBC2 *.LIB: 1600-3190 (pinyin index: a to kui)
GBC3 *.LIB: 3191-4786 (pinyin index: kui to xiao)
GBC4 *.LIB: 4787-5589 (pinyin index: xiao to zuo)

UniCode Graphic Symbol Library of TANGO Electronic CAD Software



(1) Multilevel socket
(2) Resistance
(3) Capacitance
(4) Potentiometer
(5) Inductance
(6) Quartz oscillator
(7) Diode
(8) Triode
(9) Photoelectric coupler
(10) Three-phase alternating-current motor
(11) Pushbutton switch

(12) Voltmeter
(13) Loudspeaker
(14) Bandstop filter
(15) Electromagnetic valve
(16) Microprocessor
(17) Exclusive-OR gate
(18) BD flipflop
(19) RAM
(20) AND-NOT gate
(21) OR-NOT gate
(22) Shift register
(23) Monostable flipflop
(24) Operational amplifier

This UniCode graphic symbol library is a software product developed on our own in accordance with GB4728 standard (compatible with IEC617). It contains over 3400 standard symbols of various integrated circuits (including MEMORY, INTEL, AD/DA, CMOS, TTL, operational amplifiers, comparators, voltage regulators, and other series), as well as more than 1600 standard symbols of discrete elements. Apart from this, we also developed a standard area and positional-code Chinese-character library. This software product provides a powerful tool for electronic CAD and electrical drawing standardization. We anticipate that various businesses will use our product and are ready to offer high-quality service to users.

Beijing United Aerospace Software Development Corporation
Address: Room 409
168 Xizimen Nei Avenue
Beijing 100035
Telephone: 6062488-2029; 6066325
Please contact Dai Yin and Wang Guixiang.